Grid West

RTO Cost Drivers & Considerations

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Disclaimer

Information contained within this presentation is for TSLG discussion purposes only. The data was collected from FERC Form 1 documents, annual reports, budgets, and other public documents.

Objectives

- To identify the key cost drivers and components associated with the start-up and on-going maintenance of an RTO

- Provide context for the various RTO cost components from other RTO's to enable Grid West to understand how they may be similar or different.

Identify Key Cost Components

RTO cost components were analyzed in three stages of an RTO's lifecycle.

- **Start-up** – The costs associated with the initial market design and implementation. The bulk of these costs are associated with buying/leasing a facility, people costs of creating an organization, and IT costs of implementing the various IT systems.

- **Market Re-design** – The IT and people costs associated with enhancing, updating or re-designing the market.

- **O&M** – The costs associated with the annual operation and maintenance of a RTO. These costs include payroll costs, consultant costs, and the system maintenance costs (e.g. licensing, etc.)

Start-up Costs have varied substantially across RTOs. The drivers and cost considerations for start-up are as follows:

Drivers	Considerations	Observations
Scope	• Geographic/electrical configuration • Retail and Wholesale • Market design • Real-time Operation	• Retail functions add additional cost: ERCOT • Costs of implementing systems for a scheduling/reliability coordinator e.g MISO (Day 1) are substantially different than operating a fully integrated market e.g. MISO (Day 2) • Contracting mechanisms can help mitigate start-up risk/cost: ERCOT. • Starting with existing operations can mitigate start-up: PJM, ERCOT • Outsourcing functions such as IT, market monitoring, credit/cash management, etc. can reduce or move costs: SeTrans, SPP, PJM, ARTO • Regulatory uncertainty lengthens projects and creates re-work as well as impacts vendor attitudes • Early bird or leading edge status leads to higher costs e.g. CAISO
Contracting Mechanisms	• Time & Expense vs. Fixed Fee • Incentives • Software licensing	
Infrastructure	• Existing operations/staff • Existing facilities • Existing systems	
In-house RTO Functions	• Market monitoring • Credit/cash management • IT operation	
Externalities and Timing	• Initiation, evolution, revolution • Regulatory role • IT Leading edge syndrome	

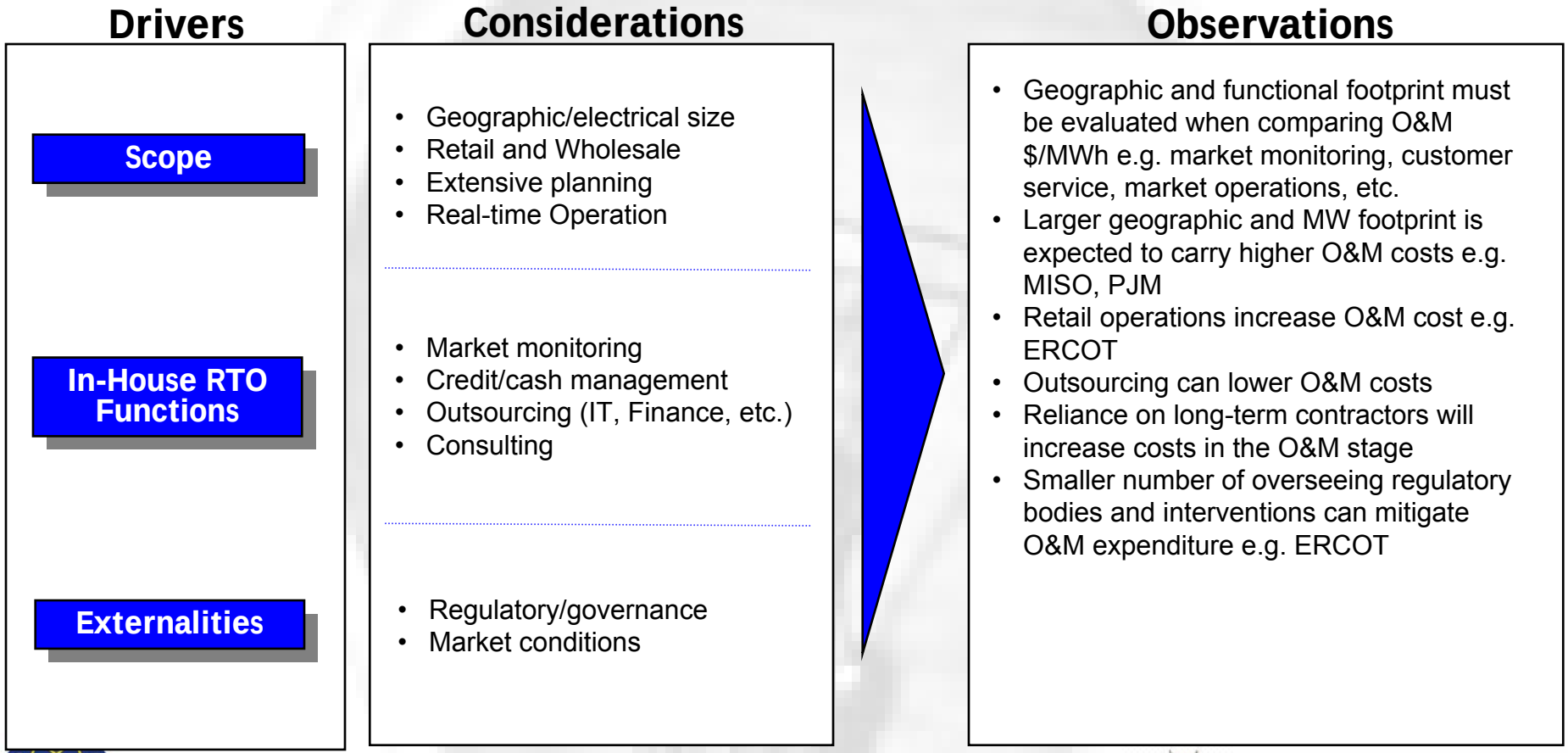
Re-design Costs

Re-design costs have varied substantially across RTOs. The drivers and cost considerations for re-design are as follows:

Drivers	Considerations	Observations
Scope	• Geographic/electrical configuration • Retail and Wholesale • Market design • Real-time Operation	• A major overhaul of the market rules can be as much as the original implementation: e.g. MD02 • Constantly changing the market rules in a short timeframe is expensive e.g. CAISO • Software license and maintenance costs contracts will impact re-design costs e.g. CAISO vs. ISO-NE • Age and flexibility of systems may dictate replacement e.g. CAISO • Strict reliability/security requirements can create new costs e.g. All RTOs • Increased functionality/expansion comes at a price e.g. PJM • Additional market features can add cost e.g. CAISO and CalPX
Initial Market Design and Implementation	• Completeness of initial market • Duration of protocol issues • Change Management procedure • Planned vs. reactive functional changes	
Development Approach	• Initial software procurement contracts • Custom development vs. Off-the-shelf applications • Business vs. Outsourcing	
Market Expansion Plan	• Geographic expansion • Market feature addition • Added reliability/security requirements	

O&M Costs

O&M costs have varied substantially across RTOs. The drivers and cost considerations for O&M are as follows:



Sampled RTOs

We analyzed how the cost drivers impacted start-up, redesign, and O&M costs for three North American RTOs and we analyzed the start-up approach of the SeTrans ISA

- **California ISO** – The California ISO was built from the ground up in a very short time frame. They had to procure a building, hire an organization, and create an infrastructure for a complex leading-edge market. They had to design their protocols simultaneously with developing their systems.

- **ERCOT** – The ERCOT ISO was created in 1996. They already had a building and a small staff. However, their market scope was larger than other markets since it included retail capabilities.

- **PJM** – The PJM ISO was created in 1998. It had pre-existed for a number of years performing the PJM Power Pool functions. An incremental approach was taken to introduce new market based functionality.

- **SeTrans ISA** –An ISO in North America intending to outsource its entire operation based on a performance based for profit business

Cost Analysis – CA ISO

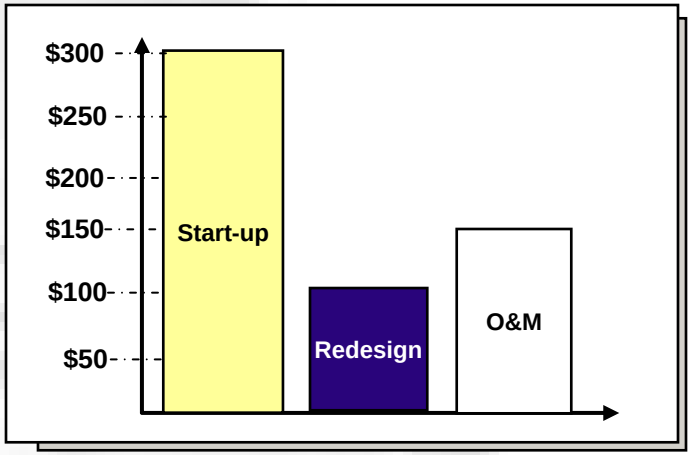
The California ISO started from the ground up, including the procurement of a building, the creation of a new organization, and the development of new systems.

California ISO

Startup
- Built from ground up
- First to market
- Legislated start date
- Big Bang approach

Re-Design
- Protocol Issues
- System flexibility
- MD02 transition
- Additional Markets

O&M
- In-house maintenance
- Infrastructure upgrades
- Reliability upgrades
- Software/infrastructure licensing
- 600 FTEs



Component	Amount
Startup	~ $300m
Redesign	~ $100m
O&M (2004)	~ $151m/year

Cost Analysis - ERCOT

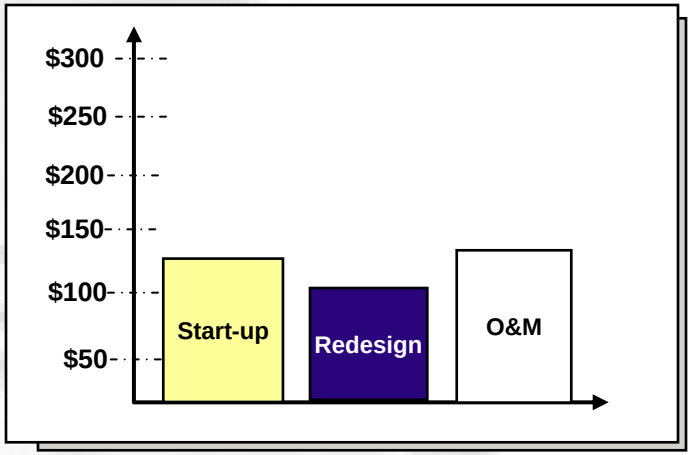
The ERCOT ISO was created in 1996. They already had a building and a small staff. However, their market scope includes both retail and wholesale capabilities.

ERCOT ISO

Startup
- Existing operations & facilities
- Retail functions
- Legislated start date
- Contract terms (Fixed Fee)
- Big Bang approach

Re-Design
- Protocol Issues (Cong Mgmt)
- Transition to Nodal
- Addition of DA Markets
- Licensing fees

O&M
- Retail functions
- No FERC oversight
- Third-party contracts
- 500 FTEs budgeted (390 actual)



Component	Amount
Startup	~ $136m
Redesign	~ $100m **
O&M (2004)	~ $143m/year

*** ERCOT is currently performing a cost/benefit study or the Texas Nodal market. Detailed cost estimates will not be available until late August.***

Cost Analysis - PJM

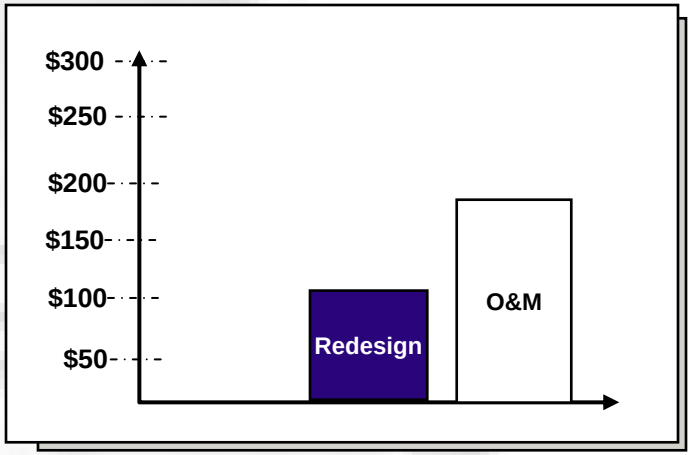
The PJM ISO was created in 1998. It already had a building and a significant staff size. An incremental implementation approach was taken.

PJM ISO

Startup
- Existing operations & facilities
- No retail functions
- Incremental approach

Re-Design
- Market Expansion
- Regulatory delays

O&M
- Large geographic footprint
- No retail functions
- Consulting services
- Custom development
- 493 FTEs



Component	Amount
Startup	-
Redesign / Expansion	~ $107m
O&M (2004)	~ $197m/year

PJM's incremental approach has demonstrated that an RTO's revenue requirement and the corresponding administrative charges will vary based upon the services provided

PJM Admin Fee

1998	1999	2000	2001	2002	2003	2004
19¢	**23¢**	**31¢**	**33¢**	**43¢**	**51¢**	**54¢**
• PJM achieves ISO status • Locational Market Price Market implemented • Capacity Market Implemented	• Financial Transmission Right Market Implemented • Retail Choice in Pennsylvania • Real-time energy Market implemented • Regional Transmission Expansion Plan Approved	• Day Ahead & Regulation Markets Implemented • Facilities Agreement reached with original PJM members to purchase assets (seven year rate moderation plan)	• PJM begins funding capital projects and recognizing depreciation and interest expenses for those projects • Security Enhancements	• Allegheny Energy Integrated • Spinning Reserve Market Implemented • Orange and Rockland Integrated	• FTR Annual Auction & Options Market Implemented • Black Start Market implemented • Rate moderation plan reaches peak collection, $33M	• Accelerated Settlement Implementation • Implementation of Marginal Losses • Implementation of Reactive Services Market • Implementation of Resource Adequacy Market

SeTrans: Experiment with a risk sharing for profit Independent System Administrator

- Outsourced Independent System Administrator (ISA) would take on the task of building and operating the market in return for a performance based rewarding mechanism
  - ISA recover its costs through transaction fees
  - ISA could earn as much as (1 +.X), or as little as (1-.X), times its fees depending on performance
  - ISA would have a separate incentive on start-up performance
- The intent of outsourcing the ISA was to lower cost by leveraging third-party capabilities (e.g., economies of scales, management capability). Typical outsourcing cost savings are in the order of 20%
- At the time, attractive pricing was anticipated due to the competitive vendor market place
- SeTrans was looking to offset the implementation risk by partnering with system developers

The following should be kept in context when evaluating potential Grid West costs:

- Wholesale scope, no retail components
- Scope of the "Beginning State" compared to other RTOs
- Interim and Advanced states will get more complex
- Grid West is not first to market
- There are no legislated/mandatory deadlines
- Market design and build are not concurrent
- Vendor market place is smaller, but still hungry
- No existing facilities or organization – Can Grid West participants be leveraged?
- Multiple regulatory bodies will add complexity and cost

Avoiding Costs

Irrespective of the approach taken by Grid West, the following key considerations are worth noting to minimize the start-up, re-design, and O&M costs of Grid West:

- **Build and Design Timing** – Completing the market design or re-design prior to the build phases will result in lower start-up/re-design costs.
- **Build and Regulatory Approval** – Minimizing spending on systems before major regulatory hurdles have been cleared will likely reduce costs.
- **Contract Terms** - Creating the proper incentives and risk sharing mechanisms will mitigate startup costs/risks. Change management processes can manage risk and cost tremendously
- **System Flexibility** – Implementing systems that are flexible to change and are not reliant on a single vendor will reduce re-design costs.
- **Costs of changing market functionality** – Do the cost benefit before making a market design change.
- **Leverage other markets functionality when regional differences don't come into play** – if it can be re-used, costs will be reduced.
- **IT leading edge** – avoid paying for vendor development.

Data Sources

- California ISO Information
  - Startup – California ISO Help Desk (Bond Issuance Data)
  - O&M – 2004 Approved Budget
  - Re-Design – Market Design Update for the Board of Governors (6/24/04)
- ERCOT ISO Information
  - Startup – ERCOT Help Desk (1999-2001 Fixed Asset Spending)
  - O&M – 2004 Approved Budget
  - Re-Design – ERCOT PUCT Filing 26376 **
- PJM ISO Information
  - O&M – 2004 Approved Budget
  - Redesign –Market Integration Stakeholder Update (December 2003)

** CAISO O&M costs do not include operating reserve costs or capital expenditures.*

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